

WHAT IS CLAIMED IS:

1. A method for assembling a stator assembly for a turbine engine, said method comprising:

positioning a shroud fabricated from a ceramic matrix composite material adjacent to a metallic stator block; and

coupling the shroud to the stator block using a coupling arrangement such that a predetermined radial clearance is defined between the shroud and a rotor assembly coupled radially inward thereof.

2. A method in accordance with Claim 1 wherein coupling the shroud to the stator block further comprises coupling the shroud to the stator block using at least one fastener that extends through a pre-formed opening in the stator block and through a pre-formed opening in the shroud.

3. A method in accordance with Claim 1 wherein coupling the shroud to the stator block further comprises coupling the shroud to the stator block using at least one fastener that includes a head portion, a nose portion, a barrel portion extending between the head and nose portions, and a sealing flange that extends radially outward from the barrel portion.

4. A method in accordance with Claim 3 wherein coupling the shroud to the stator block further comprises coupling the shroud to the stator block such that the fastener sealing flange contacts the stator block to facilitate preventing leakage between the shroud and the stator block.

5. A method in accordance with Claim 3 wherein coupling the shroud to the stator block further comprises coupling the shroud to the stator block such that the fastener sealing flange contacts the stator block such that during engine operation, a pressurized annulus is defined circumferentially around the at least one fastener, between the sealing flange and the head portion.

6. A method in accordance with Claim 3 wherein coupling the shroud to the stator block further comprises coupling the shroud to the stator block such that during engine operation, the fastener sealing flange accommodates differential thermal growth between the stator block and the shroud.

7. A method in accordance with Claim 3 wherein coupling the shroud to the stator block further comprises coupling the shroud to the stator block using at least one fastener that includes a tapered nose portion, such that the nose portion has a substantially bullnose-shaped cross-sectional profile.

8. A method in accordance with Claim 3 wherein coupling the shroud to the stator block further comprises coupling the shroud to the stator block using at least one fastener that is coated with at least one of a wear coating and a thermal barrier coating.

9. A method in accordance with Claim 3 wherein coupling the shroud to the stator block further comprises coupling the shroud to the stator block using at least one fastener that is coated with a coating that facilitates reducing oxidation of said at least one fastener.

10. A method in accordance with Claim 3 wherein coupling the shroud to the stator block further comprises coupling the shroud to the stator block using at least one fastener that includes a cooling passageway formed therein for reducing an operating temperature of the at least one fastener.

11. A method in accordance with Claim 10 wherein coupling the shroud to the stator block further comprises coupling the shroud to the stator block using at least one fastener that includes an external surface and an opening that extends from the external surface to the cooling passageway for channeling cooling fluid into the cooling passageway during engine operation.

12. A method in accordance with Claim 10 wherein coupling the shroud to the stator block further comprises coupling the shroud to the stator block using at least one fastener that includes an external surface and an opening that

extends from the external surface to the cooling passageway, wherein the opening is substantially concentrically aligned with respect to an axis of symmetry extending through the at least one fastener, and wherein the opening is for discharging cooling fluid from the cooling passageway during engine operation.

13. A stator assembly for a turbine engine, said stator assembly comprising:

a stator block comprising at least one fastener opening;

a coupling arrangement; and

a shroud coupled to said stator block by said coupling arrangement, said shroud comprising at least one fastener opening, said coupling arrangement comprising at least one fastener extending through said shroud at least one fastener opening and through said stator block at least one fastener opening, said fastener comprising an external surface coated with at least one of a wear coating and a thermal barrier coating.

14. A stator assembly in accordance with Claim 13 wherein said fastener coating facilitates thermally insulating said at least one fastener.

15. A stator assembly in accordance with Claim 13 wherein said fastener coating facilitates reducing oxidation of said at least one fastener.

16. A stator assembly in accordance with Claim 13 wherein said at least one fastener comprises at least a head portion, a barrel portion, and a nose portion, said barrel portion between said head and nose portions, at least one of said head and barrel portions comprises a plurality of threads.

17. A stator assembly in accordance with Claim 13 wherein said at least one fastener comprises a head portion, a nose portion, and a barrel portion extending therebetween, said nose portion comprises a bullnose-shaped cross-sectional profile.

18. A stator assembly in accordance with Claim 17 wherein said nose portion facilitates improving adhesion of said at least one of a wear coating and a thermal barrier coating.

19. A stator assembly in accordance with Claim 13 wherein said at least one fastener comprises a head portion, a nose portion, and a barrel portion extending therebetween, at least one of said nose portion and said barrel portion defines a cooling circuit therein.

20. A stator assembly in accordance with Claim 19 wherein said fastener further comprises an opening extending from said external surface to said cooling circuit, said opening defined within said barrel portion for supplying cooling fluid into said cooling circuit.

21. A stator assembly in accordance with Claim 19 wherein said cooling circuit extends through said barrel portion and said nose portion, said nose portion defines an opening therein for discharging cooling fluid from said cooling circuit.

22. A stator assembly in accordance with Claim 19 further comprising a sealing flange extending substantially radially outward from at least one of said head portion and said barrel portion, said sealing flange contacts a portion of said stator assembly to define a pressurized annulus extending circumferentially around said at least one fastener.

23. A stator assembly in accordance with Claim 22 wherein said sealing flange facilitates sealing between at least a portion of said stator block and said shroud.

24. A stator assembly in accordance with Claim 22 wherein said sealing flange extends circumferentially around, and is formed integrally with, said at least one fastener.

25. A stator assembly in accordance with Claim 22 wherein said sealing flange accommodates differential thermal growth between said shroud and said stator block.

26. A stator assembly in accordance with Claim 13 wherein at least one of said shroud and said at least one fastener is fabricated from a ceramic matrix composite material.

27. A turbine engine comprising:

a rotor assembly; and

a stator assembly comprising a stator block, at least one fastener, and a shroud, said shroud coupled to said stator block by said at least one fastener such that a clearance is defined between at least a portion of said rotor assembly and said shroud, said at least one fastener comprising an external surface coated with at least one of a wear coating and a thermal barrier coating.

28. A turbine engine in accordance with Claim 27 wherein at least one of said stator block and said shroud is fabricated from a ceramic matrix composite material.

29. A turbine engine in accordance with Claim 28 wherein said stator assembly at least one fastener comprises a head portion, a barrel portion, and a nose portion, said barrel portion extending between said head and nose portions, at least one of said head and barrel portions comprises a plurality of threads.

30. A turbine engine in accordance with Claim 29 wherein said at least one fastener nose portion comprises a bullnose-shaped cross-sectional profile.

31. A turbine engine in accordance with Claim 29 wherein said nose portion facilitates improved adhesion of said external surface coating.

32. A turbine engine in accordance with Claim 28 wherein said stator assembly at least one fastener comprises a cooling passageway extending at least partially therethrough.

33. A turbine engine in accordance with Claim 32 wherein said at least one fastener further comprises an external surface and at least one opening extending from said external surface to said cooling passageway, said at least one opening for channeling cooling fluid into said cooling passageway.

34. A turbine engine in accordance with Claim 32 wherein said at least one fastener further comprises a centerline axis of symmetry, an external surface, and at least one opening extending from said external surface to said cooling passageway, said opening substantially concentrically aligned with respect to said centerline axis of symmetry for discharging cooling fluid from said cooling passageway.

35. A turbine engine in accordance with Claim 34 wherein said cooling passageway is substantially concentrically aligned with respect to said at least one fastener.

36. A turbine engine in accordance with Claim 28 wherein said stator assembly at least one fastener further comprises a sealing flange extending radially outward from said at least one fastener, said sealing flange configured to contact a portion of said stator assembly such that a pressurized annulus is defined substantially circumferentially around said at least one fastener.

37. A turbine engine in accordance with Claim 36 wherein said sealing flange is further configured to contact said stator assembly in sealing contact to facilitate preventing leakage between said stator block and said shroud.

38. A turbine engine in accordance with Claim 36 wherein said sealing flange is formed integrally with said at least one fastener.

39. A turbine engine in accordance with Claim 36 wherein said sealing flange accommodates differential thermal growth between said shroud and said stator block.

40. A turbine engine in accordance with Claim 28 wherein said stator assembly fastener coating is configured to thermally insulate said at least one fastener.

41. A turbine engine in accordance with Claim 28 wherein said stator assembly fastener coating is configured to facilitate reducing oxidation of said at least one fastener.

42. A stator assembly for a turbine engine, said stator assembly comprising:

a stator block comprising at least one fastener opening;

a coupling arrangement; and

a shroud coupled to said stator block by said coupling arrangement, said shroud comprising at least one fastener opening, said coupling arrangement comprising at least one fastener extending through said shroud at least one fastener opening and through said stator block at least one fastener opening, said shroud fabricated from a ceramic matrix composite material.

43. A stator assembly in accordance with Claim 42 wherein said at least one fastener comprises a head portion, a nose portion, and a barrel portion extending therebetween, said at least one fastener further comprises a seal flange extending radially outward from said barrel portion.

44. A stator assembly in accordance with Claim 43 wherein said seal flange contacts said stator block such that a pressurized annulus is defined between said seal flange and said at least one fastener head portion.

45. A stator assembly in accordance with Claim 43 wherein said seal flange accommodates differential thermal growth between said shroud and said stator block.

46. A stator assembly in accordance with Claim 43 wherein said seal flange is configured to facilitate preventing flow leakage between said stator block and said shroud.

47. A stator assembly in accordance with Claim 43 wherein said seal flange is fabricated integrally with said at least one fastener.

48. A stator assembly in accordance with Claim 43 wherein said nose portion is tapered with a bullnose-shaped cross-sectional profile.

49. A stator assembly in accordance with Claim 43 wherein said at least one fastener is coated with at least one of a wear coating and a thermal barrier coating.

50. A stator assembly in accordance with Claim 43 wherein said at least one fastener is coated with a coating that facilitates reducing oxidation of said at least one fastener.

51. A stator assembly in accordance with Claim 43 wherein said at least one fastener further comprises a centerline axis of symmetry and a cooling passageway extending through a portion of said at least one fastener, said cooling passageway is substantially concentrically aligned within said at least one fastener.

52. A stator assembly in accordance with Claim 51 wherein said at least one fastener further comprises an external surface and at least one opening extending from said external surface to said cooling passageway, said at least one opening for channeling cooling fluid into said cooling passageway.

53. A stator assembly in accordance with Claim 51 wherein said at least one fastener further comprises an external surface and at least one opening extending from said external surface to said cooling passageway, said at least one

opening is substantially concentrically aligned with respect to said at least one fastener and is for discharging cooling fluid from said cooling passageway.